Extratropical cyclones and gales.—A few cyclones entered the northwestern part of the ocean from Asia, but the greater part of the extratropical cyclonic developments of the month occurred over northeastern waters concentrating between the vicinity of the Alaskan Peninsula and about the fortieth parallel to the southward.

To the westward of the one hundred eightieth meridian only one gale was reported prior to the 23d; that occurred on the 6th, southeast of Kamchatka. On the 23d and 26th, wind forces of 8 to 9 were experienced along those parts of the northern routes lying south of the Kuril Islands, and on the 30th a whole gale (force 10) was encountered south of the Aleutians.

In west longitudes there was a wider and more frequent distribution of storminess, with gales reported on 7 or 8 days within the area 35° to 55° N., 170° W. and the American coast. Scattered fresh-to-strong gales occurred on the 1st, 8th, 11th, 13th, and 14th, and a whole gale on the 6th; but it was not until the 19th that storminess overspread a considerable region, extending from the Washington coast and Vancouver Island west-southwestward two-thirds of the way toward Midway Island. Over the eastern half of the area the gales reported on the 19th did not exceed force 8. The most intense wind of the day was a brief gale of force 11, encountered by the Japanese steamer *Shoyo Maru*, in 41° N., 160° W. The ship's lowest barometer was 29.10. The lowest pressure occurring in an extratropical cyclone of the month was 28.56, reported by radio on the 19th by the British steamer *Eurypylus* from near 50° N., 140° W.

Following the 19th there was very little storminess in northeastern waters.

Tropical cyclones off the west coast of Mexico.—A shallow depression appeared south of Cape Corrientes on September 1 and passed inland from the Gulf of California on the 3d. No gales were reported in connection with it.

The only cyclone of the month in this locality, the track of which can be drawn with some approximation, was that of the 4th to 13th. Wind and pressure conditions on the lower part of the Gulf of Tehuantepec late on the 4th were indicative of the formation of a Low. On the early morning of the 5th the U. S. A. T. *St. Mihiel*, southbound in the vicinity of 15½° N., 98° W., ran into a succession of winds shifting over a period of about 2 hours from north, through northeast and southeast to southwest. The cyclone was of some intensity, with a maximum wind force of 9, accompanied by momentary stronger squalls, from northeast, lowest barometer 29.31. On the 6th cyclonic circulation was indicated specifically by a report from the American steamer *Kahuku*, but her lowest barometer was only 29.70, with strongest wind east, force 8, in 17°13′ N., 101°42′ W., at about local noon.

The disturbance continued to move slowly northwestward, the center lying at about 100 miles from the coast between Acapulco and Manzanillo. The southbound steamer *City of San Francisco* was considerably under the influence of the cyclone from 8 a. m. of the 7th until 6 a. m. of the 8th, with strong southeasterly winds throughout, rising to force 10 during the afternoon of the 7th, lowest barometer 29.65. The highest winds reported thereafter in connection with the disturbance, as it moved slowly past Cape Corrientes and across the mouth of the Gulf of California, were of force 7. The cylcone persisted weakly until the 13th, when it disappeared at sea off the southern west coast of Lower California.

While the disturbance already described was in progress, another cyclone formed and dissipated suddenly on the 11th close off the coast between Salina Cruz and Acapulco. Its entire known history, at this writing, is embraced in the storm reports of the American steamers *Washington* and *Virginian*, both from Los Angeles toward Balboa. The *Washington* met gales shifting from northeast, force 9, at 9 a. m. (local time), to south, force 10, at 10 a. m., lowest barometer 29.42, in 15°25′ N., 97°25′ W. The *Virginian* had a maximum wind of force 9 from the southwest at 7 p. m. of the 11th, in 16°50′ N., 99°04′ W., lowest barometer 29.65.

On the afternoon of the 24th and continuing into the 25th, the American steamer *Golden Cross*, westbound, entered into a stormy region near 18° N., 120° W. The gale began from the north-northeast, force 8, and ended from a westerly direction, highest force 9, lowest pressure, uncorrected, 29.66. A cyclone was evidently in progress to the westward of the Revillagigedo Islands.

A moderate north gale occurred in the Gulf of Tehuantepec on the morning of the 23d. Apparently it was a Tehauntepecer—the first of the season.

Typhoons and depressions of the Far East.—There were several disturbances in tropical waters of the Far East during September. A complete discussion of them by the Rev. Bernard F. Doucette, S. J., of the Manila Observatory, is anticipated and will be published in a later REVIEW if not received in time for the current issue.

From our own meager reports it appears that a cyclone of some energy lay over the Marianas on September 1. The Panaman motorship *Granville* on that date had a north gale of force 9, lowest barometer 29.57, near 21° N., 144° E. On the 4th a depression is shown on our maps east of the Nansei Islands. On the 5th it had moved to southern Japan, where it is indicated to have been of considerable depth and accompanied by strong gales. This was over the same region that had been hard hit by the disastrous typhoon of the night of August 31–September 1, mentioned in the preceding issue of the Review.

Late in the month another typhoon raged in the China Sea. Very early on the 25th the British Navy vessel *Pearleaf* reported an east-northeast gale of force 8, barometer 29.61, in 16°19′ N., 113°18′ E. On the 26th to 28th a strong typhoon moved west toward the coast of Indo China, and thence northward into the Gulf of Tonking, where it appears to have been of great energy.

Fog.—Early autumn brought a lessening in fog production on the North Pacific, especially in higher middle latitudes, east of the one hundred and eightieth meridian, where it was unusually frequent in August and unusually scarce in September. The principal fog belt of the month lay along the western third of the northern steamer routes, with some 10 to 15 percent of days with fog. In United States coastal waters fog was reported off Washington on 4 days; off California on 6 days; and off Lower California on 2 days.

LATE REPORT: TYPHOONS AND DEPRESSIONS OVER THE FAR EAST, AUGUST 1938

By BERNARD F. DOUCETTE, S. J.

[Weather Bureau, Manila, P. I.]

Typhoon, August 4–13, 1938.—From August 4 to 8, a disturbance apparently of mild intensity moved in a west-northwesterly direction from the ocean regions about 300 miles south-southeast of the Bonins to the northern Nansei (Loochoo) Islands. Because of insufficient observations it was not certain that the storm had intensified to typhoon strength until it was in the Eastern Sea, about 250 miles east of Shanghai (August 9, 6 a. m.). It continued moving west-northwest into the continent, passing over the coast line about 80 miles north of Shanghai during the early morning hours of August 10. During the

same day, it changed its course to the north-northwest, and the following day found it moving more slowly as it recurved to the northeast, passing close to and north of the Shantung Peninsula. It then weakened into a mild LOW center, moving eastward, August 13, after which no trace of it could be found.

The U. S. S. *Oahu* reported, August 10, 8:30 a. m., from "mileage 150" (vicinity of Nanking), "typhoon weather wind steady north-northwest, force 8, barometer down zero point one seven last hour to 29.23 at 0800; rain, visibility zero point one; appear to be in path of center."

During the period of formation and early history of this storm, the upper winds over Guam were from the southwest quadrant, and increased from values less than 20 k. p. h. to values between 40 and 60 k. p. h., and then decreasing as the storm moved toward the Nansei Island. Over the Philippines, the predominating directions were those of the southwest quadrant, Zamboanga however having east and southeast quadrant winds, hardly ever over 30 k. p. h. An increase of velocity appeared at Aparri, August 11, simultaneous with the formation of the typhoon of August 10 to 19. During the whole course of the typhoon, there was a high easterly current over Manila, always evident by the movement of the high clouds, but not appearing in the ascension reports of the pilot balloon observations.

Typhoon, August 10–19, 1938.—The afternoon weather map of August 10 gave evidence of the presence of a well-developed typhoon central near latitude 21° N., longitude 134° E., about 700 miles in an easterly direction from Basco, Batanes Islands. The typhoon moved in a west-northwesterly direction, inclining to the northwest as the center passed about 60 miles northeast of Ishigakijima (August 13, 6 a. m.). Two days later the center was about 200 miles north-northwest of this station, from which position it recurved to the north-northeast, moving rapidly toward Chosen (Korea) and passing over that region into the Sea of Japan, where it lost strength as it inclined to the east, north of the Sea of Japan.

Upper wind data, obtained from stations in the Philippines, showed the presence of a current of air from the southwest quadrant flowing over the whole archipelago, except southern Mindanao (Zamboanga) where east and southeast quadrant winds predominated. Simultaneous with the period of formation of this typhoon, the velocities at Aparri increased to values between 30 and 60 k. p. h. and maintained these values, August 9 to 14, then decreased, the strongest winds occurring August 9 and 10. On the western side of the China Sea, Siam, and Indochina, pilots showed that a steady southwest quadrant current existed, with values from 20 to 75 k. p. h., during this whole typhoon period and not weakening until August 16.

Typhoon August 19–23, 1938.—As before, a storm of considerable strength quickly formed over the ocean regions east of the Philippines, this time about 500 miles east of northern Luzon (August 19, 2 p. m.). The center moved northwest overnight and then inclined to the west-northwest the next day, a course which directed it across southern Formosa into the southern part of the Formosa Channel, where it disappeared.

After the preceeding typhoon had filled up, an easterly current prevailed over the Philippines, which was replaced, on August 18, by west and southwest quadrant winds, Zamboanga alone reporting east and southeast quadrant winds aloft. Velocities at Aparri, Manila, and Cebu remained less than 40 k. p. h. during the course of the typhoon.

Typhoon August 22–28, 1938.—A low pressure area, east of central Luzon, intensified and manifested itself as an active center near latitude 16° N., longitude 130° E., about 550 miles east-northeast of Manila (August 22, 6 a. m.). For about a day and a half the storm moved west-northwest and then suddenly recurved to the northeast, when about 250 miles east of northern Luzon. It then moved to the regions about 650 miles east of southern Formosa, inclined to the north and moved rapidly to Kiusiu Island. This island was afflicted with the typhoon center during the night of August 26–27, after which the storm existed for 1 day in the Sea of Japan, no trace of it appearing on the afternoon maps of August 28. There was severe flood damage to a large part of Japan due to this typhoon, but full details were not published in Manila papers.

In connection with the formation of this typhoon, only the upper winds over Cebu showed any increase in velocity of the steady southwest quadrant current flowing over the Archipelago, about 25 k. p. h. or less. After August 18 velocities over Cebu gradually increased to values as high as 40 k. p. h. August 21 and 22. Up to the afternoon of August 22, Zamboanga had east and southeast quadrant winds and then changed to the southwest quadrant, reporting these directions until August 24, when the east quadrant winds returned. Velocities during these days seldom reached values over 30 k. p. h. at any level at this station.

Typhoon August 24–28, 1938.—The map for August 24, 6 a. m. indicated by the fall in pressure at Laoag and Vigan that a disturbance was developing over the China Sea west of northern Luzon. It did not take long to intensify as it moved along a west-by-north course across the China Sea, passing over Hainan Island, where it inclined to the west-northwest, thus moving across the Gulf of Tong King into Indochina, passing close to and north of Phulien (August 28, morning). It rapidly disappeared after entering the continent.

The observations reported by the S. S. *Jeypore* seem to be significant concerning the formation of this typhoon. At 0000 G. M. T. August 23, this vessel was in latitude 18°17′ N., longitude 119°59′ E., and reported "barometer 29.63 corrected, rising slowly, temperature 80°, southeast 5, heavy swell, moderate southerly sea, overcast, frequent heavy rain squalls." This was at the time when the typhoon described above (August 19–23) was entering the Formosa Channel, where it disappeared. It is possible that this typhoon formed as a secondary disturbance depending upon the previous storm. The weather reported by the S. S. *Jeypore* is the only basis of this supposition.

This typhoon formed at the time that sudden changes in velocities occurred over Siam stations. Up to August 20, with the directions from the southwest quadrant, the velocities reported were between 5 and 60 k. p. h. No reports were received August 21, but on August 22, velocities were in general between 40 and 80 k. p. h. These values did not decrease until after August 24. This increase in velocity did not manifest itself anywhere in the Philippines, where reported velocities never reached values over 45 k. p. h., not increasing nor decreasing to any great extent during the period. It has happened that an increase in velocity at stations along the west of the China Sea would manifest itself over the Philippines about a day or so later. In the case of the typhoon under discussion, this increase, or "surge," did not travel across the China Sea. It is an example, not sufficient for forming a rule, to illustrate the use of pilot balloon data for forecasting purposes, for in this case the uniformity of velocities reported from Philippine stations in connection with the increase of velocities over regions west of the China Sea could be taken as an indication of the development of a disturbance in the China Sea.